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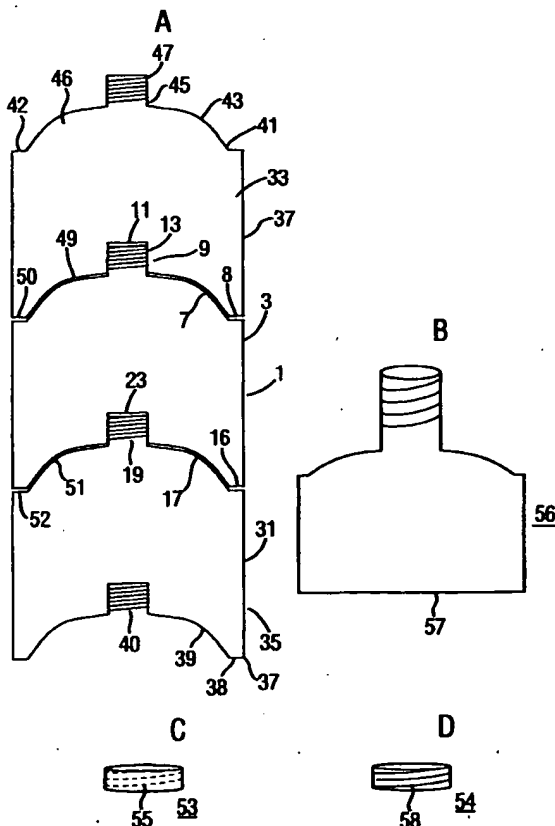
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(54) Title: CONTAINER MODULE AND MODULAR CONTAINER FORMED THEREFROM



(57) Abstract: A container module (1, 63) for a multi-compartment container for liquids, comprises first linking means (9, 77) and a second linking means (21, 79). The first-linking means (9, 77) is configured to link with a second linking means of a first other container module (33, 65) and the second linking means (21, 79) being configured to link with a first linking means of a second other container module (31, 67). At least one of the linking means provides an opening (11, 101) in said container.



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## **CONTAINER MODULE AND MODULAR CONTAINER FORMED THEREFROM**

### **FIELD OF THE INVENTION**

- 5    The present invention relates to a container module which is linkable to one or more other modules, to form a multi-compartment container. It also extends to a modular container formed of a stack of two or more modules. As used herein, the term "multi-compartment" refers to the presence of two or more modules linked together.

### **10    BACKGROUND OF THE INVENTION**

Cold beverages, such as mineral water, cola and other fruit drinks, whether still or carbonated, are commonly sold in bottles of one or two litre capacity.

- Whereas, the consumer can buy the same beverages in smaller containers, the average cost per unit volume of the beverage is higher if purchased in this
- 15    small-bottle form. In addition, consumers would sometimes prefer to purchase smaller volumes of different drinks or the same drink having different flavours etc., than buying a single large bottle of the same beverage. Yet again, if a large volume bottle is too big for a consumer to consume the contents on a single occasion, the consumer has to re-close the bottle until
- 20    further drink is required. Repeated opening and closing can cause the contents to go flat and/or stale.

The present invention, in its various embodiments, solves one or more of the aforementioned problems. It is based on the concept of compartmentalisation of a bottle into two, three or more sections.

### DEFINITION OF THE INVENTION

Therefore, the present invention now provides a container module for a multi-compartment container for liquids, said container module comprising first linking means and second linking means, said first-linking means being  
5 configured to link with a second linking means of a first other container module and said second linking means being configured to link with a first linking means of a second other container module, at least one of said linking means providing an opening in said container module.

The invention also extends to a stack of two or more such modules or a stack  
10 of such a module with at least one other different module, optionally also with a module of the invention.

### DETAILED DESCRIPTION OF THE INVENTION

The present invention is not limited to use with beverages such as carbonated drinks. It can also, for example, find use within other liquid consumable  
15 products such as milk, fruit juice, vinegar and the like, decorative liquid products such as paints, stains and varnishes, automotive liquid products such as brake fluid, motor oil, antifreeze and screen wash additives, as well as liquid personal care products such as shampoos, hair conditioners and shower gels. We may also claim a module containing any such liquid or stack  
20 of modules containing the same liquid or respective different liquids.

The present invention can generally be considered to comprise two separate classes of embodiment. The first can be regarded as equivalent to splitting a conventional large (e.g. two litre) bottle into two or more separate  
25 compartments. Each compartment is designed such that each section can become an independent bottle, and these can be joined together (e.g. by screwing) to form a complete large bottle. Each compartment can contain a different liquid, e.g. drink, hence providing greater choice to the consumer at

lower cost. Preferably, each section is substantially identical, and therefore interchangeable, requiring no particular order of attachment of the sections. However, different top and/or base sections may be provided, as will be explained in more detail hereinbelow.

- 5 As each compartment is used, rather than being disposed of, it could be attached to the base of the stack.

In the terminology of the claims, these compartments are defined as "container modules" of a "multi-compartment container for liquids". Moreover, it must be understood that the present invention is not limited to any particular  
10 cross-section or profile, although a circular section (implying cylindrical modules) is preferred. Moreover, in this class of embodiments, although screw attachment is one preferred mode, the invention is not limited to this means of attachment and others are equally possible, for example snap-fit.

Conveniently, each module may comprise a convex and a concave formation  
15 (surface) so that modules can be stacked together with respective concave and convex formations co-operating to nest adjacent modules together. These convex and concave formations may be provided with peripheral flat surfaces extending therefrom. Adjacent stacked modules then not only abut via their respective concave and convex formations but also via their  
20 peripheral flat surfaces. In some preferred embodiments, the first linking means extends from the convex formation and the second linking means extends into the module from the concave formation. Preferably, the convex and concave formations have a common axis of symmetry.

Thus, in preferred embodiments within this class, the first linking means of the  
25 container module may comprise an opening to permit outflow of liquid from the module and for effecting removable attachment to a second linking means of a first other container module, said second linking means comprising a

closed configuration for effecting removal attachment to a first linking means of a second other container module.

Preferably, in this class of embodiments, the first linking means comprises a neck formation having an opening therefrom and an external thread and the  
5 second linking means comprises a closed recess having an internal thread.

When assembled into a stack of modules constituting the equivalent of a large bottle, the modules may be interlinked via their respective first and second linking means. A base module, different from the other modules in the stack, may be constructed to be substantially similar, but without a second linking  
10 means, e.g. with a flat or narrowing frustoconical base section, for example having rib formations.

Similarly, a upper module different from or the same as in the stack may have a first linking means not attached to another module, but preferably closable with a closure, preferably a screw cap.

15 The second class of embodiments of the present invention is comparable to the first class, in that inter-linkable modules are provided. However, in this class of embodiments, the respective first and second linking means comprise openings in the module which openings are adapted to co-operate with interconnection means. The interconnecting means join adjacent modules  
20 and provide a flow path between the modules, which can be opened or closed at will. Thus, in the terminology of the claims, the first and second linking means comprise respective first and second openings and are interlockable via interconnection means with respective first or second opening in an adjacent module so that manipulation by the consumer opens or closes the  
25 flow path defined by those openings, between the two modules. Optionally, at least one interconnection means may be provided with excess pressure release means.

Preferably, the arrangement is such that the manipulation to allow the flow path to be open or closed is relative rotation of the two adjacent modules to cause alignment or non-alignment of the respective first and second openings, thereby opening or closing the flow path.

- 5 A stack of such modules may comprise at least one module according to the second class of embodiments and a second like module, except that it only has one of said first or second linking means and otherwise forms, respectively, a base or top. The same applies to the first class of embodiments. A base module will only have one such linking means and may
- 10 otherwise have a base feature as defined above in respect of the first class of embodiments. Similarly, a top module may have only one such linking means and an opening, e.g. as a neck, preferably with a screw thread, again as defined in respect of the first class of embodiments. Such a neck may be provided with a closure, e.g. a screw cap.
- 15 In another aspect of the invention, the top and base modules may form a stack container without a module according to the first aspect of the invention. Thus, a second aspect of the present invention provides a stack modular container comprising a base module and a top module, the top module being provided with an opening, said top module and base modules being
- 20 interlinked by co-operation between a linking means of the top module which linking means has a configuration as defined for the first or second linking means in the module of the first aspect of the invention and a further linking means of the base module which other linking means has a configuration as defined for the other of said first or second linking means in the said module
- 25 of the first aspect of the invention.

The interconnection means preferably comprises planar (disc) members capable of creating a seal by mutual abutment and having respective openings which open or close the flow path according to whether or not the

respective openings are in alignment, e.g. as determined by mutual rotation of the adjacent modules.

Linked modules of the second class of embodiments are preferably inhibited by suitable means to prevent the flow path therebetween from being opened  
5 before use. For example a removable adhesive tape tab bridging the modules or respective interlocking formations on the modules may be provided.

The individual modules may be formed of any appropriate material, for example a plastics material such as high density polyethylene (HDPE) or  
10 polyethylene terephthalate (PET), or from a metal such as aluminium. However, the present invention is in no way limited to these materials. HDPE modules can be formed by conventional blow moulding of an extruded parison. PET modules can be formed by conventional injection blow moulding of a heated preform. Depending on the module configuration,  
15 injection moulding of polypropylene (PP) is also possible. Modules formed of metal can be made by any suitable technique such as stamping and optionally may be provided with a protective polymer coating on the inside and/or outside. Modules and complete containers formed therefrom, may be labelled or otherwise surface decorated by the usual techniques of labelling, printing  
20 (e.g. flexo-screen print, inject printing etc).

For the avoidance of doubt, the first class of embodiments may also comprise any feature of the second class of embodiments and *vice versa*.

#### DESCRIPTION OF DRAWINGS

The present invention will now be explained in more detail by way of the  
25 following description of preferred embodiments, and with reference to the accompanying drawings in which:-

Figure 1 shows a module of a first embodiment for the present invention;



Figure 2A shows a view of a three module stack and closure therefor,

Figure 2B shows an alternative base module for the stack of Figure 2A, Figure 2C shows a screw cap for the embodiment and Figure 2D shows an alternative closure for use with a variant of this embodiment; and

- 5 Figure 3 shows a module according to a second embodiment of the present invention, incorporated in a module stack; and

Figures 4A and 4B show respective details of linking closures in the embodiment of Figure 3, in respective open and closed positions.

- Turning now to Figure 1, there is shown a module 1 of a first embodiment of the present invention. It comprises a cylindrical wall 3, at a top edge 5 of which, a convex wall or shoulder 7 extends upwardly and inwardly via a horizontal circumferential rim 8 to a cylindrical neck portion 9. The neck portion 9 terminates in an opening 11. The neck portion 9 is provided with an external screw thread 13.

- 15 Similarly, a lower edge 15 of the cylindrical wall 3, extends via a horizontal circumferential rim 16 into a concave wall 17. The concave wall 17 extends inwardly to a recess 19 bounded by an inwardly and upwardly extended cylindrical wall 21, closed by a flat surface 23. The cylindrical wall 23 of the recess portion is provided with an internal thread 27. The recess 19 with  
20 internal thread 27 is configured to cooperate with and screwably receive, a neck portion 9, and the external thread thereof 13, of a like module.

- Thus, it can be appreciated that a plurality of two or more like modules 1 may be screwed together to form a module stack, as shown in Figure 2A. In this stack, the module 1 as shown in Figure 1 forms the centre module of a stack  
25 of three such modules also comprising a base module 31 and a top module 33.

The base module 31 also has an outer cylindrical wall 35 which is contiguous with the outer cylindrical wall 3 of centre module 1. Similarly, the upper module 33 has an outer cylindrical wall 37 which is contiguous with the outer cylindrical wall 3 of the first module 1.

- 5 The lower edge 37 of the lower module 31 extends via a horizontal rim 38 into a concave at the centre of which is disposed a closed recess 40 identical to closed recess 19 of the centre module 1. The up edge 41 of the upper module 33 progressively extends via a horizontal rim 42 into a shoulder 43 which terminates in an upper neck portion 45 providing an opening from the  
10 interior 46 of the upper module 33. The cylindrical neck portion 45 is provided with an external thread 47.

- The upper neck portion 9 of the centre module 1, by virtue of its outer screw thread 13 is screwably received into a closed recess extending upwardly from the curved lower surface 49 of the upper module 33. The curved lower  
15 surface 49 is contiguous with a circumferential horizontal rim 50. The recess of the upper module 33 exactly corresponds to the lower recess cylindrical member 21 of the first module 1, so that screwable attachment between the upper 33 and middle 1 modules is effected. Since the curvature of the upper shoulder 7 of the first module and the lower surface 49 of the respective  
20 middle and upper modules correspond in profile, they effect snug fit with the circumferential rim 50 of the upper module 33 sitting on the upper circumferential rim 8 of the centre module 1.

- The base module 31 is attached to the middle module 1 in like fashion. Specifically, a neck member with external thread, identical to neck member 9  
25 with thread 13 of the middle module 1, extends upwardly from a shoulder 51 of the base module. Again, the curved shoulder 51 is contiguous with a horizontal circumferential rim 52. Screwably received into the recess 21 of the middle module. Again, the curvature of the upper shoulder 51 of the base

module and the lower concave surface 17 of the centre module, correspond to effect snug fit, with the lower circumferential rim 16 of the centre module 1 sitting on the circumferential rim 52 of the base module 31.

5 In use, as shown in Figure 2C, a screw cap 53 is provided so that the user can open or close the bottle formed by the module stack, at will. This is provided with an internal thread 55 to cooperate with the external thread 47 of the upper module 33.

The modules of this particular stack are formed by injection blow moulding of PET. The screw cap 53 is also formed of PET but could also be injection  
10 moulded polypropylene (PP) or low density polyethylene (LDPE). Paper or plastics or metal foil seals may also be used instead of, or in addition to a screw top.

In a variation of this arrangement, the neck portion of each respective portion of each module has an independent foil seal which can be removed after  
15 detaching the module above (except of course for the top module). The respective seal is removed prior to accessing the contents of that module. The upper module can then be discarded and the relevant module sealed with a screw cap. Alternatively, the upper module can be replaced.

However, a consumer may prefer an independent cap for each module rather  
20 than the one-off seal mechanism so that the drink can be consumed at will. Under these circumstances, the cap 54 may then have an external thread (Figure 2D) so that it can match, and screw into, the base of each module. Depending on the design of the module neck and opening, the internal design of the cap may be threaded or otherwise. This design, however, does  
25 somewhat restrict the stacking procedure after use as each module must have its cap in place to be able to screw on to one another.

Figure 2B shows an alternative base module 56 which may be used in place of the base module 31 in the stack in Figure 2A. This is identical to the base module 31 except that instead of concave lower wall 39, the bottom 57 is flat.

Turning now to Figure 3, there is shown a stack 61 comprising a centre module 63 according to a second embodiment of the present invention. The stack 61 also comprises an upper module 65 and a lower module 67.

The centre module 63 comprises an outer cylindrical wall 69, the upper edge 71 of which extends into a horizontal top surface member 73 formed of the same material. Similarly, the lower edge 75 of the cylindrical wall 69 extends into a lower flat surface member 75. The upper 73 and lower 75 surface members are made of the same material as the outer wall 69.

At the centre of the upper 73 and lower 75 wall members, is provided a respective circular hole 77, 79. Since injection moulding and injection blow moulding can normally only produce a container with a hole at the top thereof, the second hole may be formed by cutting or punching.

The lower module 67 has an outer cylindrical wall 81 contiguous with the outer cylindrical wall 69 of the centre module 69. At the lower edge 83 of the lower module 67, the outer wall 81 extends into a flat bottom surface member 85. Similarly, the upper edge 87 of the lower or base module 81 extends into an upper flat surface member 89. The upper surface member 89 and lower surface member 85 are made of the material as the outer wall 81. The upper surface member 89 has a circular hole 91 formed at the centre thereof, corresponding in position and dimensions, to the lower cylindrical hole 79 of the centre module 63.

The upper module 65 has an outer cylindrical wall 93, also contiguous with the outer cylindrical wall 69 of the centre module. The lower edge 95 of this

outer cylindrical wall 93 of the upper module extends into a flat lower surface member 97, made of the same material.

The outer cylindrical wall 93 of the upper module extends into a shoulder region 97 which terminates in a neck member 99 protruding upwardly  
5 therefrom, and finally terminating in an opening 101. This neck member has an outer cylindrical thread 103 for cooperating with a screw cap (not shown).

The lower surface member 97 of the upper module 93 has a circular hole 105 at the centre thereof of the same dimensions as, and overlapping with, the cylindrical hole 77 of the centre module 63.

10 Thus, a pathway between the middle 63 and upper 65 modules is defined by the holes 77, 105 respectively formed in the abutting upper/lower surfaces of these members. Likewise, a lower pathway is constituted by the overlap between the circular hole 91 in the upper surface of lower module 67 and the lower hole 79 in the lower surface of the middle module 63.

15 The upper pathway defined by holes 77, 105 is closed by a resilient seal member 107 made of PET or even silicone rubber. The lower pathway constituted by holes 79, 91 is also enclosed by an identical seal member 109, also formed of PET. Again, silicone rubber is another option. The upper 107 and lower 109 seal members respectively link and keep joined together whilst  
20 permitting relative mutual rotation (by means not shown), the upper 65 and middle modules and the middle 63, and lower 67 modules, but allow relative rotational motion therebetween.

The seal members 107, 109 are each respectively formed by two overlapping silicone rubber disks. For simplicity, a plan view of one of the seal members  
25 (107) is shown in Figures 4A and 4B. Each of the overlapping silicone rubber disks is provided with a cut-away sector 109. Relative rotation of, for example, the upper 65 and centre 63 modules, according to desire of the

user, will cause the respective open sectors 109 of the upper and lower silicone rubber disks to overlap (Figure 4A) or to be out of alignment (Figure 4B), thus providing an open or closed path between the modules. This rotational motion is described by arrows 108, 110. Relative rotation between the middle 63 and lower module 67 opens or closes the path therebetween, in like manner.

Before use, i.e. including at the point of sale, relative rotation between the upper 65, middle 63 and lower 67 sections is inhibited by respective removable adhesive tape tabs 111, 113 across the boundaries of the outer walls of those members. Of course, the product is sold with the seals in the closed position. Optionally, the seal member may have very small perforations to release excess pressure in each module, venting via the uppermost module.

The stack bottle according to the second embodiment can be made by any of the methods and of the materials, described above in respect of the first embodiment shown in Figures 1 and 2.

Thus, as described, unlike the first embodiment, this second embodiment is suited to marketing of a single drink but compartmentalised in similar fashion. Each module uses a turn on/off mechanism rather than the screw link of the first embodiment. The mechanism comprises a set of two sliding disks that rotate around the same axis. Both disks have a small opening which can be superimposed by the rotating action to an open position, or to be non-overlapping in the closed position.

Prior to filling, each module is twisted along its central axis of symmetry to the open position. This connected the sections together and the liquid can fill the module as in a normal bottle. Each section is then given a quarter turn to close the opening said at the lower compartment (module) is isolated and becomes an independent mini-bottle. Each section is then sealed by the tab.

In use, when the bottle is being used, the screw lid at the top is removed as in a normal bottle and the drink in the upper module may be consumed.

- To access the drink in the next module down, a relative quarter turn twist is applied between the empty compartment and the one below, so that the seal
- 5 is broken to permit access thereto.

On dispensing, the liquid travels from the lower module to the upper empty module and eventually out of the bottle.

Once the lower module is exhausted, relative turning between it and the module below allows the drink in that module to be accessed and so-on.

- 10 Since the interior of one section at a time is exposed to atmospheric pressure, this prevents the rest of the drink from losing its carbonation (in the case of carbonated contents).

- In the light of this description, modifications to the described embodiments, as well as other embodiments, all within the scope of the present invention as
- 15 defined by the appended claims and without departing from the spirit of said invention, will now become apparent to persons skilled in the art.

**CLAIMS**

1. A container module (1, 63) for a multi-compartment container for  
5 liquids, said container module comprising first linking means (9, 77) and  
second linking means (21, 79), said first-linking means (9, 77) being  
configured to link with a second linking means of a first other container  
module (33, 65) and said second linking means (21, 79) being configured to  
link with a first linking means of a second other container module (31, 67).
- 10 2. A container module according to claim 1, wherein said first and second  
linking means (9, 21, 77, 79) have a common rotational axis.
3. A container module according to claim 1 or claim 2, comprising a  
convex formation (7) and a concave formation (17).
4. A container module according to any preceding claim, wherein said first  
15 linking means (9) comprises an opening (11) to permit outflow of liquid from  
the module and for effecting removable attachment to a second linking means  
of a first other container module, said second linking means (21) comprising a  
closed configuration for effecting removable attachment to a first linking  
means of a second other container module.
- 20 5. A container module according to claim 4, wherein said first linking  
means (9) comprises a neck formation having an opening (11) therefrom and  
an external thread (13) and said second linking means (21) comprises a  
closed recess (19) having an internal thread (27).



6. A stack of two or more modules (1) according to claim 4 or claim 5, said modules being interlinked via their respective first and second linking means.
7. A stack of modules according to claim 6, further comprising a base  
5 module (31) constructed as a module as defined in claim 4 or claim 5, but without a second linking means.
8. A stack of modules according to claim 6 or claim 7, wherein the first linking means of the uppermost module is closed with a closure (53).
9. A container module (63) according to any of claims 1-3, wherein said  
10 first and second linking means comprise respective first and second openings (77, 79) for interlockable via interconnection means (107, 109) with respective first or second openings (91, 105) in another module (65, 67) so that manipulation by the user opens or closes a flow path defined by said first and second openings (77, 79).
- 15 10. A container module according to claim 9, wherein said interconnection means (107, 109) comprises at least a pair of planar members capable of creating a seal by mutual abutment and having respective openings (109) for opening or closing the flow path depending upon whether or not said openings in the planar members are in alignment.
- 20 11. A container module according to claim 10, wherein relative mutual rotation (108, 110) of adjacent modules (63, 65) about an axis of rotation causes the alignment or non-alignment of the respective openings (109).
12. A stack (61) of modules (63, 65, 67) comprising a module according to claim 9 or claim 10, and at least one other module (65, 67) having only a first  
25 or a second of said interlockable openings and either a base (85) or a neck opening (99).

13. A stack (61) according to claim 12, comprising two or more modules according to claim 8 or claim 9.

14. A stack (61) according to claim 12 or claim 13, comprising at least module (63) according to claim 8 or claim 9, a second module (67) having a  
5 base (85) and a third module (65) having a neck opening (99).

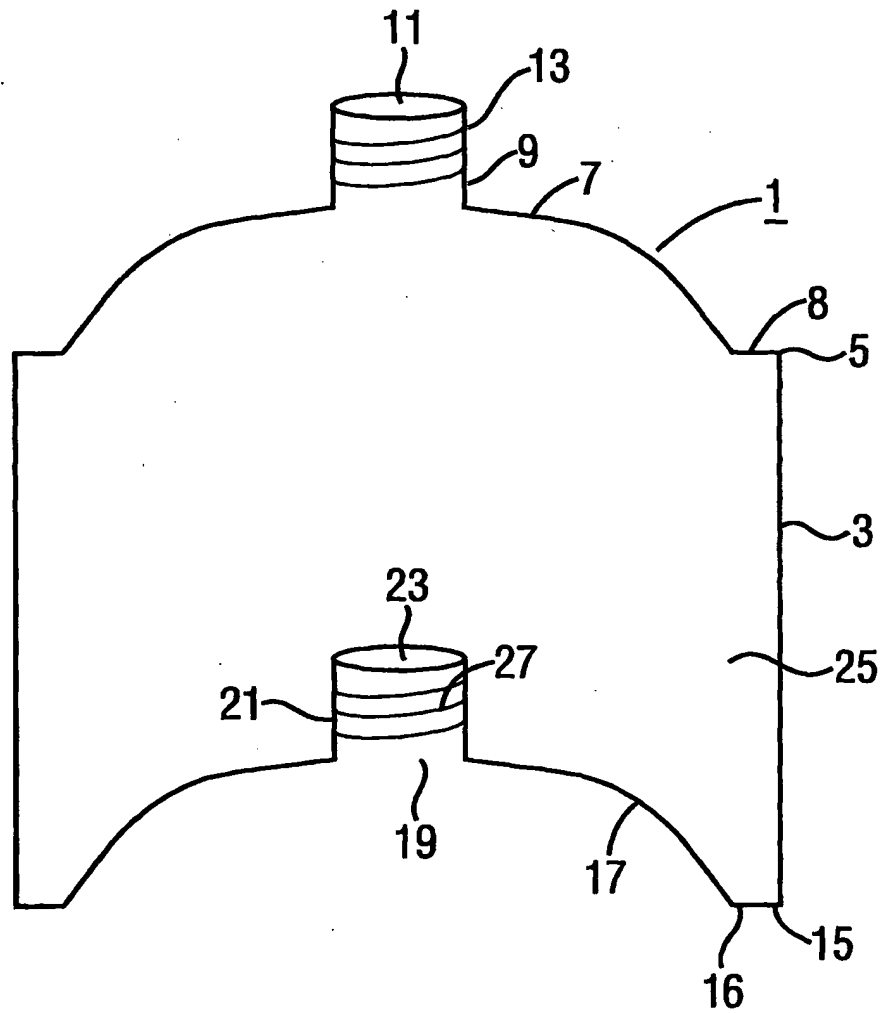
15. A stack (61) according to any of claims 9-14, further comprising a closure for said neck opening.

16. A stack modular container comprising a base module (31, 67) and a top module (33, 65), the top module (33, 65) being provided with an opening,  
10 said top module (33, 65) and base module (31, 67) being interlinked by co-operation between a linking means of the top module which linking means has a configuration as defined for the first or second linking means in the module of any of claims 1-5 or 9-11 and a further linking means of the base module which other linking means has a configuration as defined for the other of said  
15 first or second linking means in the said module of any of claims 1-5 or 9-11.

17. A stack (61) according to any of claims 12-16, further comprising means (111, 113) for inhibiting opening of said flow path before first use.

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FIG. 1



2/3

FIG. 2A

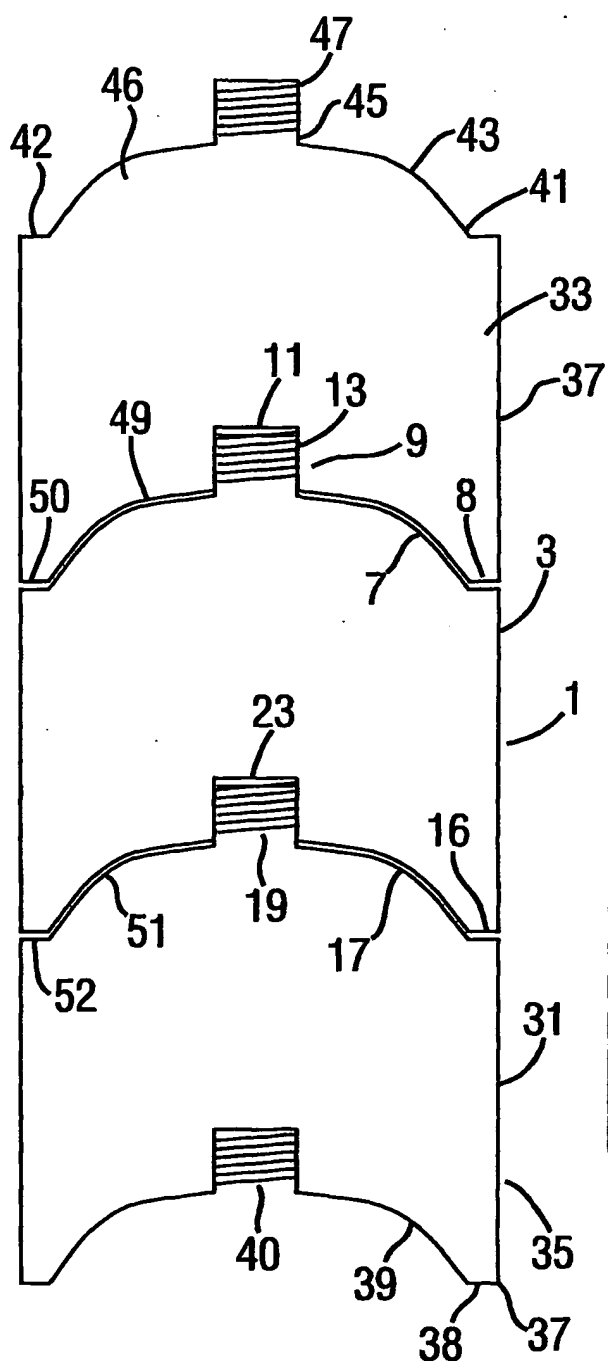


FIG. 2B

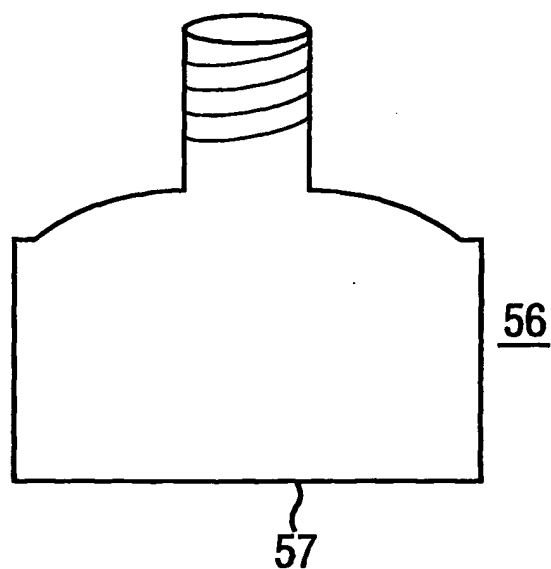


FIG. 2C

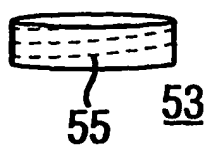
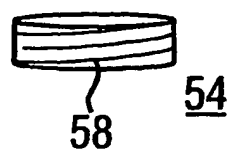


FIG. 2D



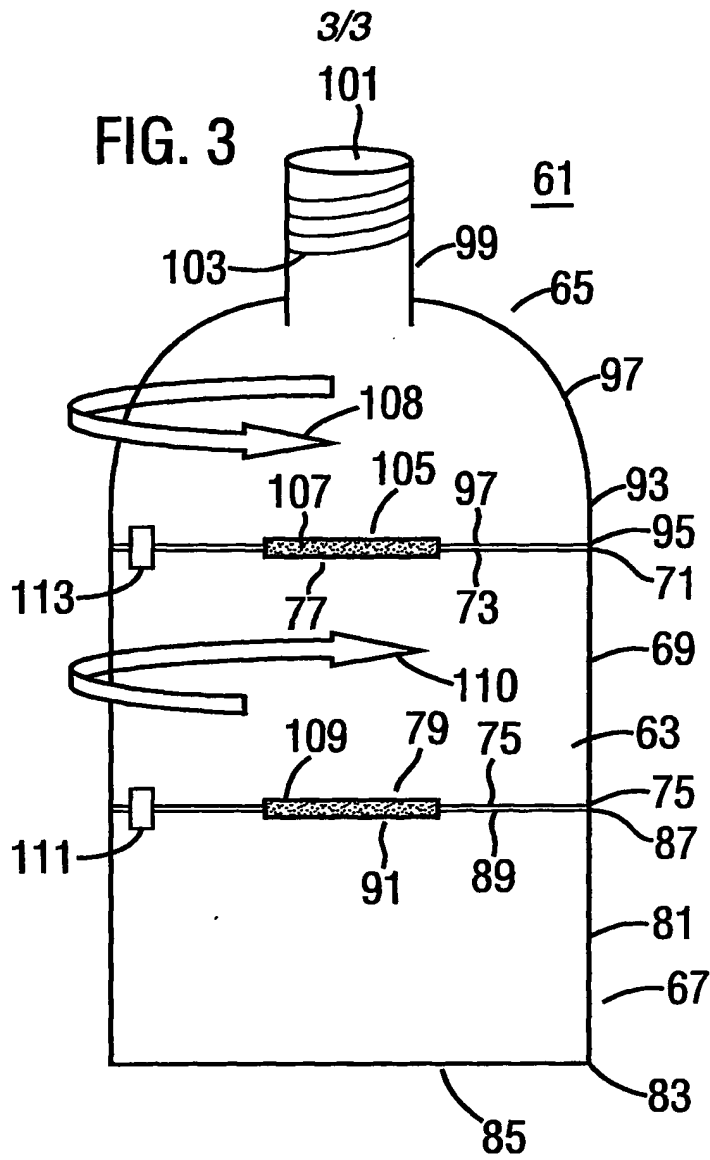


FIG. 4A

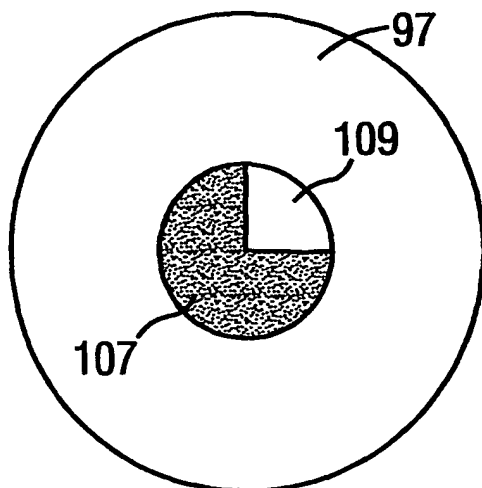
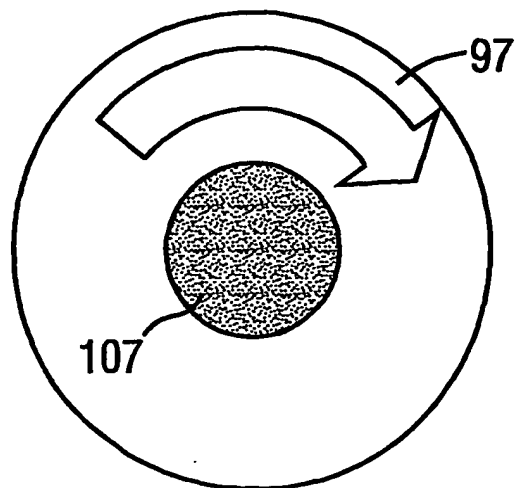


FIG. 4B



## INTERNATIONAL SEARCH REPORT

 Int: application No  
 PU, -- J1/01911

 A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 B65D21/02 B65D81/32

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 782 702 A (MINAMOUR INTERNATIONAL GROUP) 3 March 2000 (2000-03-03) the whole document	1,2,4-6, 8,16
X	DE 197 19 136 A (NORDMEIER) 12 November 1998 (1998-11-12) the whole document	1-6,8,16
X	DE 296 22 585 U (STRIEBEL) 23 April 1998 (1998-04-23) the whole document	1-6,8,16
X	FR 2 684 072 A (COUDERC) 28 May 1993 (1993-05-28) the whole document	1-6,8,16
	-/-	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

28 August 2001

Date of mailing of the international search report

04/09/2001

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## INTERNATIONAL SEARCH REPORT

Int: Application No

Pl. No. 01/01911

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Int. application No

PCT/JP91/01911

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GB 2357072	A	13-06-2001	NONE	